Order Code RL33528

CRS Report for Congress

Industrial Competitiveness and Technological Advancement: Debate Over Government Policy

Updated August 1 , 2007

Wendy H. Schacht
Specialist in Science and Technology
Resources, Science, and Industry Division

Prepared for Members and Committees of Congress

Report Documentation Page

Form Approved
OMB No. 0704-0188

1. REPORT DATE	2. REPORT TYPE	3. DATES COVERED
01 AUG 2007		**00-00-2007 to 00-00-2007**

4. TITLE AND SUBTITLE	5a. CONTRACT NUMBER
Industrial Competitiveness and Technological Advancement: Debate Over Government Policy	5b. GRANT NUMBER
	5c. PROGRAM ELEMENT NUMBER
6. AUTHOR(S)	5d. PROJECT NUMBER
	5e. TASK NUMBER
	5f. WORK UNIT NUMBER
7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES) **Congressional Research Service,The Library of Congress,101 Independence Ave,Washington,DC,20540-7500**	8. PERFORMING ORGANIZATION REPORT NUMBER
9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS(ES)	10. SPONSOR/MONITOR'S ACRONYM(S)
	11. SPONSOR/MONITOR'S REPORT NUMBER(S)

12. DISTRIBUTION/AVAILABILITY STATEMENT
Approved for public release; distribution unlimited

13. SUPPLEMENTARY NOTES

14. ABSTRACT

15. SUBJECT TERMS

16. SECURITY CLASSIFICATION OF:			17. LIMITATION OF ABSTRACT	18. NUMBER OF PAGES	19a. NAME OF RESPONSIBLE PERSON
a. REPORT **unclassified**	b. ABSTRACT **unclassified**	c. THIS PAGE **unclassified**	**Same as Report (SAR)**	**24**	

Industrial Competitiveness and Technological Advancement: Debate Over Government Policy

Summary

There is ongoing interest in the pace of U.S. technological advancement due to its influence on U.S. economic growth, productivity, and international competitiveness. Because technology can contribute to economic growth and productivity increases, congressional attention has focused on how to augment private-sector technological development. Legislative activity over the past two decades has created a policy for technology development, albeit an ad hoc one. Because of the lack of consensus on the scope and direction of a national policy, Congress has taken an incremental approach aimed at creating new mechanisms to facilitate technological advancement in particular areas and making changes and improvements as necessary.

Congressional action has mandated specific technology development programs and obligations in federal agencies that did not initially support such efforts. Many programs were created based upon what individual committees judged appropriate within the agencies over which they had authorization or appropriation responsibilities. The use of line item funding for these activities, including the Advanced Technology Program and the Manufacturing Extension Program of the National Institute of Standards and Technology, as well as for the Undersecretary for Technology at the Department of Commerce, is viewed by proponents as a way to ensure that the government encourages technological advance in the private sector.

Some legislative activity, beginning in the 104th Congress, has been directed at eliminating or significantly curtailing many of these federal efforts. Although this approach has not been adopted, the budgets for several programs have declined. Questions have been raised concerning the proper role of the federal government in technology development and the competitiveness of U.S. industry. As the 110th Congress begins to develop its budget priorities, how the government encourages technological progress in the private sector again may be explored and/or redefined.

Contents

Industrial Competitiveness and Technological Advancement: Debate Over Government Policy

Most Recent Developments

Congressional initiatives have often been relied on over the past 25 years to support technological advancement in U.S. industry. This approach has involved both direct measures that concern budget outlays and the provision of services by government agencies (such as the Advanced Technology Program (ATP) and the Manufacturing Extension Partnership (MEP) of the National Institute of Standards and Technology) and indirect measures that include financial incentives and legal changes. Many of these efforts, however, have been revisited since the 104th Congress given the then Republican majority's statements in favor of indirect strategies such as tax policies, intellectual property right protection, and antitrust laws to promote technological advancement; increased government support for basic research; and decreased direct federal funding for private sector technology initiatives. Beginning in FY2000, the original House-passed appropriation bills have not included funding for ATP. In addition, the President's FY2003 budget for the first time requested a significant reduction in support for MEP based on the idea that all manufacturing extension centers operating more than six years should continue without federal funding. While no program has been eliminated, several have been financed at reduced levels.

P.L. 110-5, enacted in the 110th Congress, provides FY2007 appropriations of $104.6 million for MEP and $79 million for ATP. The President's FY2008 budget proposes a significant decrease in support for manufacturing extension to $46.3 million and includes no funding for ATP. H.R. 3093, as passed by the House, would provide $108.8 million for MEP and $93.1 million for ATP. S. 1745, as reported from the Senate Committee on Appropriations, would finance MEP at $110 million and fund ATP at $100 million (with a $10 million rescission from these two activities). The Manufacturing Technology Competitiveness Act of 2007, H.R. 255, establishes several new manufacturing technology programs for small and medium-sized firms. Appropriations for MEP through FY2012 would be authorized by S. 69. The Technology Innovation and Manufacturing Stimulation Act of 2007, H.R. 1868, as passed by the House, authorizes funding for NIST through FY2010 and creates several new manufacturing R&D programs in that organization as does H.R. 2272, the 21st Century Competitiveness Act of 2007, as agreed to in the conference report, in addition to creating a new Technology Innovation Program to replace ATP (among other things).

Several of the actions detailed in the "American Competitiveness Initiative" announced by the President in the 2006 State of the Union Address are included in

bills introduced in the 110th Congress. The ACI proposed various innovation-related activities including increased basic research funding, making permanent the research and experimentation tax credit (which was extended through the end of 2007 by P.L. 109-432), and improved math and science education. S. 833, the Competitiveness Through Education, Technology , and Enterprise Act of 2007, would make the research tax credit permanent, as does S. 41, the Research Competitiveness Act of 2007, and H.R. 1712, the Research and Development Tax Credit Act of 2007, which also create tax exempt facility bonds for the development of research park facilities, among other things. S. 592 extends the research credit through 2012. H.R. 85, the Energy Technology Transfer Act, as passed by the House, would establish a program of grants to non-profit institutions, state and local governments, cooperative extension services, or universities to transfer energy efficient methods and technologies. H.R. 363, the Sowing the Seeds Through Science and Engineering Research Act, as passed by the House, authorizes a Presidential Innovation Award, among other things. S. 761, the America Creating Opportunities to Meaningfully Promote Excellence in Technology, Education, and Science Act, passed by the Senate and incorporated as an amendment to H.R. 2772 (see above), would authorize appropriations for NIST through FY2011, as well as providing for the creation of several programs, studies, and initiatives designed to improve U.S. innovation and competitiveness.

Background and Analysis

Technology and Competitiveness

Interest in technology development and industrial innovation increased as concern mounted over the economic strength of the nation and over competition from abroad. For the United States to be competitive in the world economy, U.S. companies must be able to engage in trade, retain market shares, and offer high quality products, processes, and services while the nation maintains economic growth and a high standard of living. Technological advancement is important because the commercialization of inventions provides economic benefits from the sale of new products or services; from new ways to provide a service; or from new processes that increase productivity and efficiency. It is widely accepted that technological progress is responsible for up to one-half the growth of the U.S. economy, and is one principal driving force in long-term growth and increases in living standards.

Technological advances can further economic growth because they contribute to the creation of new goods, new services, new jobs, and new capital. The application of technology can improve productivity and the quality of products. It can expand the range of services that can be offered as well as extend the geographic distribution of these services. The development and use of technology also plays a major role in determining patterns of international trade by affecting the comparative advantages of industrial sectors. Since technological progress is not necessarily determined by economic conditions — it also can be influenced by advances in science, the organization and management of firms, government activity, or serendipity — it can have effects on trade independent of shifts in macroeconomic

factors. New technologies also can help compensate for possible disadvantages in the cost of capital and labor faced by firms.

Federal Role

In the recent past, American companies faced increased competitive pressures in the international marketplace from firms based in countries where governments actively promote commercial technological development and application. In the United States, the generation of technology for the commercial marketplace is primarily a private sector activity. The federal government traditionally becomes involved only for certain limited purposes. Typically these are activities which have been determined to be necessary for the "national good" but which cannot, or will not, be supported by industry.

To date, the U.S. government has funded research and development (R&D) to meet the mission requirements of the federal departments and agencies. It also finances efforts in areas where there is an identified need for research, primarily basic research, not being performed in the private sector. Federal support reflects a consensus that basic research is critical because it is the foundation for many new innovations. However, any returns created by this activity are generally long term, sometimes not marketable, and not always evident. Yet the rate of return to society as a whole generated by investments in research is significantly larger than the benefits that can be captured by the firm doing the work.[1]

Many past government activities to increase basic research were based on a "linear" model of innovation. This theory viewed technological advancement as a series of sequential steps starting with idea origination and moving through basic research, applied research, development, commercialization, and diffusion into the economy. Increases in federal funds in the basic research stage were expected to result in concomitant increases in new products and processes. However, this linear concept is no longer considered valid. Innovations often occur that do not require basic or applied research or development; in fact most innovations are incremental improvements to existing products or processes. In certain areas, such as biotechnology, the distinctions between basic research and commercialization are small and shrinking. In others, the differentiation between basic and applied research is artificial. The critical factor is the *commercialization* of the technology. Economic benefits accrue only when a technology or technique is brought to the marketplace where it can be sold to generate income or applied to increase productivity. Yet, while the United States has a strong basic research enterprise, foreign firms appear equally, if not more, adept at taking the results of these scientific efforts and making commercially viable products. Often U.S. companies are competing in the global

---

[1] Edwin Mansfield, "Social Returns From R&D: Findings, Methods, and Limitations," *Research/Technology Management*, November-December 1991, 24. See also Charles I. Jones and John C. Williams, "Measuring the Social Return to R&D," *Quarterly Journal of Economics*, November 1998, 1119 and Richard R. Nelson and Paul M. Romer, "Science, Economic Growth, and Public Policy," in Bruce R. Smith and Claude E. Barfield, eds. *Technology, R&D, and the Economy*, (Washington, The Brookings Institution and the American Enterprise Institute, Washington, 1996), 57.

marketplace against goods and services developed by foreign industries from research performed in the United States. Thus, there has been increased congressional interest in mechanisms to accelerate the development and commercialization processes in the private sector.

The development of a governmental effort to facilitate technological advance has been particularly difficult because of the absence of a consensus on the need for an articulated policy. Technology demonstration and commercialization have traditionally been considered private sector functions in the United States. While over the years there have been various programs and policies (such as tax credits, technology transfer to industry, and patents), the approach had been ad hoc and uncoordinated. Much of the program development was based upon what individual committees judged appropriate for the agencies over which they have jurisdiction. Despite the importance of technology to the economy, technology-related considerations often have not been integrated into economic decisions.

There have been attempts to provide a central focus for governmental activity in technology matters. P.L. 100-519 created within the Department of Commerce a Technology Administration headed by a new Under Secretary for Technology. In November 1993, former President Clinton established a National Science and Technology Council to coordinate decisionmaking in science and technology and to insure their integration at all policy levels. However, technological issues and responsibilities remain shared among many departments and agencies. This diffused focus has sometimes resulted in actions which, if not at cross purposes, may not have accounted for the impact of policies or practices in one area on other parts of the process. Technology issues involve components which operate both separately and in concert. While a diffused approach can offer varied responses to varied issues, the importance of interrelationships may be underestimated and their usefulness may suffer.

Several times, Congress has examined the idea of an industrial policy to develop a coordinated approach on issues of economic growth and industrial competitiveness. Technological advance is both one aspect of this and an altogether separate consideration. In looking at the development of an identified policy for industrial competitiveness, advocates argue that such an effort could ameliorate much of the uncertainty with which the private sector perceives future government actions. Some commentators have argued that consideration and delineation of national objectives could encourage industry to engage in more long-term planning with regard to R&D and to make decisions as to the best allocation of resources. Such a technology policy could generate greater consistency in government activities. Because technological development involves numerous risks, efforts to minimize uncertainty regarding federal programs and policies may help alleviate some of the disincentives perceived by industry.

The development of a technology policy, however, is a contentious issue. There is widespread resistance to what could be and has been called national planning, due variously to doubts as to its efficacy, to fear of adverse effects on our market system, to political beliefs about government intervention in our economic system, and to the current emphasis on short- term returns in both the political and economic arenas. Opponents of a national industrial policy may see this approach as government

interference in the marketplace to "pick winners and losers." Instead, it is argued, measures that would occasion a better investment environment for industry to expand innovation-related efforts would be preferable to government decisionmaking in technological advancement.

Consideration of what constitutes government policy (both in terms of the industrial policy and technology policy) covers a broad range of ideas from laissez-faire to special government incentives to target specific high-technology, high-growth industries. Suggestions have been made for the creation of federal mechanisms to identify and support strategic industries and technologies. Various federal agencies and private sector groups have developed critical technology lists. However, others maintain that such targeting is an unwanted, and unwarranted, interference in the private sector which will cause unnecessary dislocations in the marketplace or a misallocation of resources. From their perspective, the government does not have the knowledge or expertise to make business-related decisions. Instead, they argue, the appropriate role for government is to encourage innovative activities in all industries and to keep market related decisionmaking within the business community that has ultimate responsibility for commercialization and where such decisions have traditionally been made.

The relationship between government and industry often is a major factor affecting innovation and the environment within which technological development takes place. This relationship can be adversarial, with the government acting to regulate or restrain the business community, rather than to facilitate its positive contributions to the nation. However, this may be changing as the benefits of industry/government cooperation become more apparent. There are an increasing number of areas where the traditional distinctions between public and private sector functions and responsibilities are becoming blurred. Many assumptions have been questioned, particularly in light of the increased internationalization of the U.S. economy. The business sector is no longer viewed in an exclusively domestic context; the economy of the United States is often tied to the economies of other nations. The technological superiority long held by the United States in many areas has been challenged by other industrialized countries in which economic, social, and political policies and practices foster government-industry cooperation in technological development.

A major divergence from the past was evident in the approach taken by the former Clinton Administration. Articulated in two reports issued in February 1993 (*A Vision of Change for America and Technology for America's Economic Growth, A New Direction to Build Economic Strength*),[2] the proposal called for a national commitment to, and a strategy for, technological advancement as part of a defined national economic policy. This detailed strategy offered a policy agenda for economic growth in the United States, of which technological development and industrial competitiveness were critical components.

In articulating a national technology policy, the approach initially recommended and subsequently followed by the Clinton Administration was multifaceted and

---

[2] Available from author.

provided a wide range of options while for the most part reflecting then current trends in congressional efforts to facilitate industrial advancement. This policy increased federal coordination and augmented direct government spending for technological development. While many past activities focused primarily on research, the new initiatives shifted the emphasis toward *development* of new products, processes, and services by the private sector for the commercial marketplace. In addition, a significant number of the proposals aimed to increase both government and private sector support for R&D leading to the commercialization of technology.

To facilitate technological advance, the Clinton approach focused on increasing investment; *investment* in research, primarily civilian research, to meet the Nation's needs in energy, environmental quality, and health; investment in the development and commercialization of new products, processes, and services for the marketplace; investment in improved manufacturing to make American goods less expensive and of better quality; investment in small, high technology businesses in light of their role in innovation and job creation; and investment in the country's infrastructure to support all these efforts. To make the most productive use of this increased investment, the Administration supported increased *cooperation* between all levels of government, industry, and academia to share risk, to share funding, and to utilize the strengths of each sector in reaching common goals of economic growth, productivity improvement, and maintenance of a high living standard. On November 23, 1993, President Clinton issued Executive Order 12881 establishing a National Science and Technology Council, a cabinet-level body to "coordinate science, space, and technology policies throughout the federal government."

The approach adopted by the former Administration has been questioned by recent Congresses and by the current Bush Administration. Instead, policies have appeared to support indirect strategies such as tax incentives, intellectual property protection, and antitrust laws to promote technology advancement, increased government support for basic research, and decreased direct federal funding for private sector technology activities. In the 2006 State of the Union Address, President Bush announced the "American Competitiveness Initiative" to facilitate innovation and provide "our nation's children a firm grounding in math and science." To achieve these goals, the President has called for doubling over the next 10 years the amount of federal funding for basic research, particularly in the National Science Foundation, the Office of Science in the Department of Energy, and in the core programs of the National Institute of Standards and Technology, Department of Commerce. In addition, the Initiative would increase the number of math and science teachers and make the research and experiment tax credit permanent.

Despite the continuing debate on what is the appropriate role of government and what constitutes a suitable government technology development policy, it remains an undisputed fact that what the government does or does not do affects the private sector and the marketplace. The various rules, regulations, and other activities of the government have become de facto policy as they relate to, and affect, innovation and technological advancement.

Legislative Initiatives and Current Programs

Legislative initiatives have reflected a trend toward expanding the government's role beyond traditional funding of mission-oriented R&D and basic research toward the facilitation of technological advancement to meet other critical national needs, including the economic growth that flows from new commercialization and use of technologies and techniques in the private sector. An overview of recent legislation shows federal efforts aimed at (1) encouraging industry to spend more on R&D; (2) assisting small high-technology businesses; (3) promoting joint research activities between companies; (4) fostering cooperative work between industry and universities; (5) facilitating the transfer of technology from the federal laboratories to the private sector; and (6) providing incentives for quality improvements. These efforts tend toward removing barriers to technology development in the private sector (thereby permitting market forces to operate) and providing incentives to encourage increased private sector R&D activities. While most focus primarily on research, some also involve policies and programs associated with technology development and commercialization.

Increased R&D Spending. To foster increased company spending on research, the 1981 Economic Recovery Tax Act (P.L. 97-34) mandated a temporary incremental tax credit for qualified research expenditures. The law provided a 25% tax credit for the increase in a firm's qualified research costs above the average expenditures for the previous three tax years. Qualified costs included in-house expenditures such as wages for researchers, material costs, and payments for use of equipment; 65% of corporate grants towards basic research at universities and other relevant institutions; and 65% of payments for contract research. The credit applied to research expenditures through 1985.

The Tax Reform Act of 1986 (P.L. 99-514) extended the research and experimentation (R&E) tax credit for another three years. However, the credit was lowered to 20% and made applicable to only 75% of a company's liability. The 1988 Tax Corrections Act (P.L. 100-647) approved a one-year extension of the research tax credit. The Omnibus Budget Reconciliation Act (P.L. 101-239) extended the credit through September 30, 1990 and made small start-up firms eligible for the credit. The FY1991 Budget Act (P.L. 101-508) again continued the tax credit provisions through 1992. The law expired in June 1992 when former President Bush vetoed H.R. 11 that year. However, P.L. 103-66, the Omnibus Budget Reconciliation Act of 1993, reinstated the credit through July 1995 and made it retroactive to the former expiration date. The tax credit again was allowed to expire until P.L. 104-188, the Small Business Job Protection Act, restored it from July 1, 1996 through May 31, 1997. P.L. 105-34, the Taxpayer Relief Act of 1997, extended the credit for 13 months from June 1, 1997 through June 30, 1998. Although it expired once again at the end of June, the Omnibus Consolidated Appropriations Act, P.L. 105-277, reinstated the tax credit through June 30, 1999. During the 105th Congress, various bills were introduced to make the tax credit permanent; other bills would have allowed the credit to be applied to certain collaborative research consortia. On August 5, 1999, both the House and Senate agreed to the conference report for H.R. 2488, the Financial Freedom Act, which would have extended the credit for five years through June 30, 2004. This bill also would have increased the credit rate applicable under the alternative incremental research credit by one percentage point

per step. While the President vetoed the overall appropriations bill on September 23, 1999, the same provisions were included in Title V of P.L. 106-170 signed into law on December 17, 1999. P.L. 108-311 extended the research tax credit through December 31, 2005 while P.L. 109-432 extends the credit through the end of 2007.[3]

The Small Business Development Act (P.L. 97-219), as extended (P.L. 99-443), established a program to facilitate increased R&D within the small-business, high-technology community. Each federal agency with a research budget was required to set aside 1.25% of its R&D funding for grants to small firms for research in areas of interest to that agency. P.L. 102-564, which reauthorized the Small Business Innovation Research (SBIR) program, increased the set-aside over a five-year period to 2.5% by 1997. Funding is, in part, dependent on companies obtaining private sector support for the commercialization of the resulting products or processes. The authorization for the program was set to terminate October 1, 2000. However, the SBIR activity was reauthorized through September 30, 2008 by P.L. 106-554, signed into law on December 21, 2000. P.L. 102-564 also created a pilot effort, the Small Business Technology Transfer (STTR) program, to encourage firms to work with universities or federal laboratories to commercialize the results of research. This program initially was funded by a 0.15% (phased in) set-aside. Set to expire in FY1997, the STTR originally was extended for one year until P.L. 105-135 reauthorized this activity through FY2001. Subsequently, P.L. 107-50 extended the program through FY2009 and expanded the set-aside to 0.3% beginning in FY2004. Also in FY2004, the amount of individual Phase II grants increased to $750,000. (See CRS Report 96-402, *Small Business Innovation Research Program*, by Wendy H. Schacht.)

The Omnibus Trade and Competitiveness Act of 1988 (P.L. 100-418) created the Advanced Technology Program (ATP) at the Department of Commerce's National Institute of Standards and Technology (NIST). ATP provides seed funding, matched by private sector investment, for companies or consortia of universities, industries, and/or government laboratories to accelerate development of generic technologies with broad application across industries. The first awards were made in 1991. As of the end of 2004 (after which time no new awards have been made), 768 projects had been funded representing approximately $2.3 billion in federal dollars matched by $2.1 billion in private sector financing. About 66% of the awardees are small businesses or cooperative efforts led by such firms. A new grant competition was announced in April 2007. (For more information, see CRS Report 95-36, *The Advanced Technology Program*, by Wendy H. Schacht.)

Appropriations for the ATP included $35.9 million in FY1991, $47.9 million in FY1992, and $67.9 million in FY1993. FY1994 appropriations increased significantly to $199.5 million and even further in FY1995 to $431 million. However, P.L. 104-6, rescinded $90 million from this amount. The original FY1996 appropriations bill, H.R. 2076, which passed the Congress, was vetoed by President Clinton, in part, because it provided no support for ATP. The appropriations legislation finally enacted, P.L. 104-134, did fund the Advanced Technology

---

[3] For additional information see CRS Report RL31181, *Research Tax Credit: Current Status and Selected Issues for Congress*, by Gary Guenther.

Program at $221 million. For FY1997, the President's budget request was $345 million. However, P.L. 104-208, the Omnibus Consolidated Appropriations Act, provided $225 million for ATP, later reduced by $7 million to $218 million by P.L. 105-18. The Administration's FY1998 budget requested $276 million in funding; P.L. 105-119 appropriated $192.5 million for ATP, again at a level less than the previous year. The President's FY1999 budget proposal included $259.9 million for this program, a 35% increase. While not providing such a large increase, P.L. 105-277 did fund ATP at $197.5 million, 3% above the previous year. This figure reflected a $6 million rescission contained in the same law that accounted for "deobligated" funds resulting from early termination of certain projects.

In FY2000, the Clinton Administration proposed $238.7 million for ATP, an increase of 21% over the previous year. H.R. 2670, as passed by the House, provided no funding for the activity. The report to accompany the House bill stated that there was insufficient evidence "to overcome those fundamental questions about whether the program should exist in the first place." S. 1217, as passed by the Senate, would have appropriated $226.5 million for ATP. P.L. 106-113 eventually did finance the program at $142.6 million, 28% below prior year funding. The following year, the President's FY2001 budget included $175.5 million for ATP, an increase of 23% over the earlier fiscal year. Once again, the original version of the appropriations bill that passed the House did not contain any financial support for the activity. However, P.L. 106-553 provided $145.7 million in FY2001 support for ATP, 2% above the previous funding level.

For FY2002, President Bush's budget proposed suspending all funding for new ATP awards pending an evaluation of the program. In the interim, $13 million would have been provided to meet the financial commitments for on-going projects. H.R. 2500, as initially passed by the House, also did not fund new ATP grants but offered $13 million for prior commitments. The version of H.R. 2500 that originally passed the Senate provided $204.2 million for the ATP effort. P.L. 107-77 funded the program at $184.5 million, an increase of almost 27% over the previous fiscal year.

The Bush Administration's FY2003 budget request would have funded ATP at $108 million; 35% below the FY2002 appropriation level. While no relevant appropriations legislation was passed by the 107th Congress, a series of Continuing Resolutions funded the program until the 108th Congress enacted P.L. 108-7 which financed ATP at $178.8 million for FY2003 (after a mandated 0.65% across the board recision).

In its FY2004 budget, the Administration proposed to provide $17 million to cover on-going commitments to ATP; however no new projects would be funded. H.R. 2799, the FY2004 appropriations bill initially passed by the House, included no support for ATP. Subsequently incorporated into H.R. 2673, which became P.L. 108-199, the legislation funded ATP at $179.2 million (prior to a mandated 0.59% across the board rescission). As reported to the Senate from the Committee on Appropriations, S. 1585 would have financed the program at $259.6 million.

The President's FY2005 budget, as well as H.R. 4754, the Commerce, Justice, State Appropriations bill originally passed by the House, did not include any funding for ATP. As reported to the Senate from the Committee on Appropriations, S. 2809

would have provided $203 million for the program, 19% above the previous fiscal year. P.L. 108-447, the FY2005 Omnibus Appropriations Act, funded ATP at $136.5 million (after several rescissions mandated in the legislation), 20% below FY2004.

For FY2006, the Administration's budget and H.R. 2862, as originally passed by the House, again did not include funding for the Advanced Technology Program. The version of H.R. 2862 initially passed by the Senate would have provided ATP with $140 million. The final FY2006 appropriation legislation, P.L. 109-108, finances the program at $79 million (after mandated rescissions), 42% less than the last fiscal year.

The President's FY2007 budget did not include funding for ATP, nor did H.R. 5672, the FY2007 Science, State, Justice, Commerce, and Related Agencies Appropriations Act, as passed by the House on June 29, 2006 and as reported from the Senate Committee on Appropriations. While no final FY2007 appropriations legislation was enacted during the 109th Congress, ATP was funded through February 15, 2007 by a series of continuing resolutions. Passed in the 110th Congress, P.L. 110-5 provides FY2007 appropriations of $79 million for the program.

The Administration's FY2008 budget proposal does not include support for the Advanced Technology Program. H.R. 3093, as passed by the House, would fund the program at $93.1 million; S. 1745, as reported from the Senate Committee on Appropriations, would provide $100 million.

The 21st Century Competitiveness Act (H.R. 2272), as agreed to in conference, would create a new Technology Innovation Program (TIP) to replace ATP. While similar to ATP in the intent to promote high-risk R&D that would be of broad-based economic benefit to the nation, there are several differences in the operation of the new activity. Funding under TIP would be limited to small and medium-sized businesses whereas grants under ATP are available to companies regardless of size. In addition, in the Advanced Technology Program, joint ventures must include two separately owned for-profit firms and may include universities, government laboratories, and other research establishments as participants in the project but not as recipients of the grant. In the TIP initiative, a joint venture may involve two separately owned for-profit companies but may also be comprised of one small or medium-sized firm and a university (or other non-profit research organization). A single company may receive up to $2 million dollars for up to three years under ATP; under TIP, the participating company (which must be a small or medium-sized business) may receive up to $3 million for up to three years. In ATP, small and medium-sized companies are not required to cost share (large firms must provide 60% of the total cost of the project) while in TIP there is a 50% cost sharing requirement which, again, only applies to the small and medium-sized businesses that are eligible. There are no funding limits for the five-year funding available for joint ventures under ATP; the TIP limits joint venture funding to $9 million for up to five years. The Advisory Board that was created to assist in the Advanced Technology Program includes industry representatives as well as federal government personnel and representatives from other research organizations. The Advisory Board for the Technology Innovation Program would be comprised of only private sector members.

Industry-University Cooperative Efforts. The promotion of cooperative efforts among academia and industry is aimed at increasing the potential for the commercialization of technology. (For more information, see CRS Report RL33526, *Cooperative R&D: Federal Efforts to Promote Industrial Competitiveness*, by Wendy H. Schacht.) Traditionally, basic research has been performed in universities or in the federal laboratory system while the business community focuses on the manufacture or provision of products, processes, or services. Universities are especially suited to undertake basic research. Their mission is to educate and basic research is an integral part of the educational process. Universities generally are able to undertake these activities because they do not have to produce goods for the marketplace and therefore can do research not necessarily tied to the development of a commercial product or process.

Subsequent to World War II, the federal government supplanted industry as the primary source of funding for basic research in universities. It also became the principal determinant of the type and direction of the research performed in academia. This resulted in a disconnect between the university and industrial communities. The separation and isolation of the parties involved in the innovation process is thought by many observers to be a barrier to technological progress. The difficulties in moving an idea from the concept stage to a commercial product or process may be compounded when several entities are involved. Legislation to stimulate cooperative efforts among those involved in technology development has been viewed as one way to promote innovation and facilitate the international competitiveness of U.S. industry.

Several laws have attempted to encourage industry-university cooperation. Title II of the Economic Recovery Tax Act of 1981 (P.L. 97-34) provided, in part, a 25% tax credit for 65% of all company payments to universities for the performance of basic research. Firms were also permitted a larger tax deduction for charitable contributions of equipment used in scientific research at academic institutions. The Tax Reform Act of 1986 (P.L. 99-514) kept this latter provision, but reduced the credit for university basic research to 20% of all corporate expenditures for this over the sum of a fixed research floor plus any decrease in non-research giving.

The 1981 act also provided an increased charitable deduction for donations of new equipment by a manufacturer to an institution of higher education. This equipment must be used for research or research training for physical or biological sciences within the United States. The tax deduction is equal to the manufacturer's cost plus one-half the difference between the manufacturer's cost and the market value, as long as it does not exceed twice the cost basis. These provisions were extended through July 1995 by the Omnibus Budget Reconciliation Act of 1993, but then expired until restored by the passage of P.L. 104-188, P.L. 105-277, and P.L. 106-170 as noted above. H.R. 6111, passed by both the House and Senate during the 109th Congress and awaiting the President's signature, extends the research credit through the end of 2007.

Amendments to the patent and trademark laws contained in P.L. 96-517 (commonly called the "Bayh-Dole Act") also were designed to foster interaction between academia and the business community. This law provides, in part, for title to inventions made by contractors receiving federal R&D funds to be vested in the

contractor if they are small businesses, universities, or not-for-profit institutions. Certain rights to the patent are reserved for the government and these organizations are required to commercialize within a predetermined and agreed upon time frame. Providing universities with patent title is expected to encourage licensing to industry where the technology can be manufactured or used thereby creating a financial return to the academic institution. University patent applications and licensing have increased significantly since this law was enacted. (See CRS Report RL32076, The Bayh-Dole Act: Selected Issues in Patent Policy and the Commercialization of Technology and CRS Report RL30320, *Patent Ownership and Federal Research and Development: A Discussion on the Bayh-Dole Act and the Stevenson-Wydler Act*, both by Wendy H. Schacht.)

The CREATE Act, P.L. 108-453, makes changes in the patent laws to promote cooperative research and development among universities, government, and the private sector. The bill amends section 103(c) of title 25, United States Code, such that certain actions between researchers under a joint research agreement will not preclude patentability. (For more detail see CRS Report RS21882, *Collaborative R&D and the Cooperative Research and Technology Enhancement (CREATE) Act*, by Wendy H. Schacht.)

Joint Industrial Research. Private sector investments in basic research are often costly, long term, and risky. Although not all advances in technology are the result of research, it is often the foundation of important new innovations. To encourage increased industrial involvement in research, legislation was enacted to allow for joint ventures in this arena. It is argued that cooperative research reduces risks and costs and allows for work to be performed that crosses traditional boundaries or expertise and experience. Such collaborative efforts make use of existing and support the development of new resources, facilities, knowledge, and skills.

The National Cooperative Research Act (P.L. 98-462) encourages companies to undertake joint research. The legislation clarifies the antitrust laws and requires that a "rule of reason" standard be applied in determinations of violations of these laws; cooperative research ventures are not to be judged illegal "per se." It eliminates treble damage awards for those research ventures found in violation of the antitrust laws if prior disclosure (as defined in the law) has been made. P.L. 98-462 also makes changes in the way attorney fees are awarded. Defendants can collect attorney fees in specified circumstances, including when the claim is judged frivolous, unreasonable, without foundation, or made in bad faith. However, the attorney fee award to the prevailing party may be offset if the court decides that the prevailing party conducted a portion of the litigation in a manner which was frivolous, unreasonable, without foundation, or in bad faith. These provisions were included to discourage frivolous litigation against joint research ventures without simultaneously discouraging suits of plaintiffs with valid claims. Between 1985 (when the law went into effect) and 2003, 913 joint research ventures have filed with the Department of Justice.

P.L. 103-42, the National Cooperative Production Amendments Act of 1993, amends the National Cooperative Research Act by, among other things, extending the original law's provisions to joint manufacturing ventures. These provisions are

only applicable, however, to cooperative production when (1) the principal manufacturing facilities are "located in the United States or its territories, and (2) each person who controls any party to such venture ... is a United States person, or a foreign person from a country whose law accords antitrust treatment no less favorable to United States persons than to such country's domestic persons with respect to participation in joint ventures for production."

Commercialization of the Results of Federally Funded R&D. Another approach to encouraging the commercialization of technology involves the transfer of technology from federal laboratories and contractors to the private sector where commercialization can proceed. Because the federal laboratory system has extensive science and technology resources and expertise developed in pursuit of mission responsibilities, it is a potential source of new ideas and knowledge which may be used in the business community. (See CRS Report RL33527, *Technology Transfer: Utilization of Federally Funded Research and Development*, by Wendy H. Schacht for more details.)

Despite the potential offered by the resources of the federal laboratory system, however, the commercialization level of the results of federally funded R&D remained low. Studies indicated that only approximately 10% of federally owned patents were ever utilized. There are many reasons for this low level of usage, one of which is the fact that some technologies and/or patents have no market application. However, industry unfamiliarity with these technologies, the "not-invented-here" syndrome, and perhaps more significantly, the ambiguities associated with obtaining title to or exclusive license to federally owned patents also contribute to the low level of commercialization.

Over the years, several governmental efforts have been undertaken to augment industry's awareness of federal R&D resources. The Federal Laboratory Consortium for Technology Transfer was created in 1972 (from a Department of Defense program) to assist in transferring technology from the federal government to state and local governments and the private sector. To expand on the work of the Federal Laboratory Consortium, and to provide added emphasis on the commercialization of government technology, Congress passed P.L. 96-480, the Stevenson-Wydler Technology Innovation Act of 1980. Prior to this law, technology transfer was not an explicit mandate of the federal departments and agencies with the exception of the National Aeronautics and Space Administration. To provide "legitimacy" to the numerous technology activities of the government, Congress, with strong bipartisan support, enacted P.L. 96-480 which explicitly states that the federal government has the responsibility, "to ensure the full use of the results of the nation's federal investment in research and development." Section 11 of the law created a system within the federal government to identify and disseminate information and expertise on what technologies or techniques are available for transfer. Offices of Research and Technology Applications were established in each federal laboratory to distinguish technologies and ideas with potential applications in other settings.

Several amendments to the Stevenson-Wydler Technology Innovation Act have been enacted to provide additional incentives for the commercialization of technology. P.L. 99-502, the Federal Technology Transfer Act, authorizes activities designed to encourage industry, universities, and federal laboratories to work

cooperatively. It also establishes incentives for federal laboratory employees to promote the commercialization of the results of federally funded research and development. The law amends P.L. 96-480 to allow government-owned, government-operated laboratories to enter into cooperative R&D agreements (CRADAs) with universities and the private sector. This authority is extended to government-owned, contractor-operated laboratories by the Department of Defense FY1990 Authorization Act, P.L. 101-189. (See CRS Report 95-150, *Cooperative Research and Development Agreements (CRADAs)*, by Wendy Schacht.) Companies, regardless of size, are allowed to retain title to inventions resulting from research performed under cooperative agreements. The federal government retains a royalty-free license to use these patents. The Technology Transfer Improvements and Advancement Act (P.L. 104- 113), clarifies the dispensation of intellectual property rights under CRADAs to facilitate the implementation of these cooperative efforts. The Federal Laboratory Consortium is given a legislative mandate to assist in the coordination of technology transfer. To further promote the use of the results of federal R&D, certain agencies are mandated to create a cash awards program and a royalty sharing activity for federal scientists, engineers, and technicians in recognition of efforts toward commercialization of this federally developed technology. These efforts are facilitated by a provision of the National Defense Authorization Act for FY1991 (P.L. 101-510), which amends the Stevenson-Wydler Technology Innovation Act to allow government agencies and laboratories to develop partnership intermediary programs to augment the transfer of laboratory technology to the small business sector.

Amendments to the Patent and Trademark law contained in Title V of P.L. 98-620 made changes which are designed to improve the transfer of technology from the federal laboratories — especially those operated by contractors — to the private sector and increase the chances of successful commercialization of these technologies. This law permits the contractor at government-owned, contractor-operated laboratories (GOCOs) to make decisions at the laboratory level as to the granting of licenses for subject inventions. This has the potential of effecting greater interaction between laboratories and industry in the transfer of technology. Royalties on these inventions are also permitted to go back to the laboratory contractor to be used for additional R&D, awards to individual laboratory inventors, or education. While there is a cap on the amount of the royalty returning directly to the lab in order not to disrupt the agency's mission requirements and congressionally mandated R&D agenda, the establishment of discretionary funds gives contractor-operated laboratories added incentive to encourage technology transfer.

Under P.L. 98-620, private companies, regardless of size, are allowed to obtain exclusive licenses for the life of the patent. Prior restrictions allowed large firms use of exclusive license for only 5 of the 17 years (now 20 years) of the life of the patent. This was expected to encourage improved technology transfer from the federal laboratories or the universities (in the case of university operated GOCOs) to large corporations which often have the resources necessary for development and commercialization activities. In addition, the law permits GOCOs (those operated by universities or nonprofit institutions) to retain title to inventions made in the laboratory within certain defined limitations. Those laboratories operated by large companies are not included in this provision.

P.L. 106-404, the Technology Transfer Commercialization Act, altered practices concerning patents held by the government to make it easier for federal agencies to license such inventions. The law amends the Stevenson-Wydler Technology Innovation Act and the Bayh-Dole Act to decrease the time delays associated with obtaining an exclusive or partially exclusive license. Previously, agencies were required to publicize the availability of technologies for three months using the *Federal Register* and then provide an additional 60 day notice of intent to license by an interested company. Under this legislation, the time period was shortened to 15 days in recognition of the ability of the internet to offer widespread notification and the necessity of time constraints faced by industry in commercialization activities. Certain rights are retained by the government. The bill also allows licenses for existing government-owned inventions to be included in CRADAs.

The Omnibus Trade and Competitiveness Act (P.L. 100-418) mandated the creation of a program of regional centers to assist small manufacturing companies to use knowledge and technology developed under the auspices of the National Institute of Standards and Technology and other federal agencies. Federal funding for the centers is matched by non-federal sources including state and local governments and industry. Originally, seven Regional Centers for the Transfer of Manufacturing Technology were selected. The initial program was expanded in 1994 to create the Manufacturing Extension Partnership (MEP) to meet new and growing needs of the community. In a more varied approach, the Partnership involves both large centers and smaller, more dispersed organizations sometimes affiliated with larger centers as well as the NIST State Technology Extension Program which provides states with grants to develop the infrastructure necessary to transfer technology from the federal government to the private sector (an effort which was also mandated by P.L. 100-418) and a program which electronically ties the disparate parties together along with other federal, state, local, and academic technology transfer organizations. There are now centers in all 50 states and Puerto Rico. Since the manufacturing extension activity was created in 1989, awards made by NIST have resulted in the creation of approximately 350 regional offices. [It should be noted that the Department of Defense also funded 36 centers through its Technology Reinvestment Project (TRP) in FY1994 and FY1995. When the TRP was terminated, NIST took over support for 20 of these programs in FY1996 and funded the remaining efforts during FY1997.]

Funding for this program was $11.9 million in FY1991, $15.1 million in FY1992, and $16.9 million in FY1993. In FY1994 support for the expanded Manufacturing Technology Partnerships was $30.3 million. The following fiscal year, P.L. 103-317 appropriated $90.6 million for this effort, although P.L. 104-19 rescinded $16.3 million from this amount. While the original FY1996 appropriations bill, H.R. 2076, was vetoed by the President, the $80 million funding for MEP was retained in the final legislation, P.L. 104-134. The President's FY1997 budget request was $105 million; P.L. 104-208 appropriated $95 million for manufacturing extension while temporarily lifting the six-year limit on federal support for individual centers. For FY1998, the Administration requested funding of $123 million. The FY1998 appropriations bill, P.L. 105-119, financed the MEP program at $113.5 million. This law also permitted government funding, at one-third the centers total annual cost, to continue for additional periods of one year over the original six-year limit, if a positive evaluation is received. The President's FY1999 budget included

$106.8 million for the MEP, a 6% decrease from current funding. The Omnibus Consolidated Appropriations Act, P.L. 105-277, appropriated the $106.8 million. The decrease in funding reflected a reduced federal financial commitment as the centers mature, not a decrease in program support. In addition, the Technology Administration Act of 1998, P.L. 105-309, permits the federal government to fund centers at one-third the cost after the six years if a positive, independent evaluation is made every two years.

For FY2000, the Clinton Administration requested $99.8 million in support for MEP. Again, the lower federal share indicated a smaller statutory portion required of the government. S. 1217, as passed by the Senate, would have appropriated $109.8 million for the Manufacturing Extension Partnership, an increase of 3% over FY1999. H.R. 2670, as passed initially by the House, would have appropriated $99.8 million for this activity. The version of the H.R. 2670 passed by both House and Senate provided FY2000 appropriations of $104.8 million. While the President vetoed that bill, the legislation that was ultimately enacted, P.L. 106-113, appropriated $104.2 million after a mandated rescission. The President's FY2001 budget requested $114.1 million for the Partnership, an increase of almost 9% over the earlier fiscal year. P.L. 106-553 appropriated $105.1 million.

The FY2002 Bush Administration budget proposed providing $106.3 million for MEP. H.R. 2500, as originally passed by the House, would have funded MEP at $106.5 million. The initial version of H.R. 2500 passed by the Senate would have provided $105.1 million for the program. The final legislation, P.L. 107-77 funded the Partnership at $106.5 million.

For FY2003, the Administration's budget included an 89% decrease in support for MEP. According to the budget document, "consistent with the program's original design, the President's budget recommends that all centers with more than six years experience operate without federal contribution." A number of Continuing Resolutions supported the Partnership at FY2002 levels until the 108th Congress enacted P.L. 108-7 which appropriated $105.9 million for MEP in FY2003 (after a mandated recision).

The President's FY2004 budget requested $12.6 million for MEP to finance only those centers that have not reached six years of federal support. H.R. 2799, as initially passed by the House, would have appropriated $39.6 million for the Partnership. This bill was subsequently incorporated into H.R. 2673, which became P.L. 108-199, the FY2004 Consolidated Appropriations Act. This legislation financed MEP at $38.7 million after a mandated rescission. S. 1585, reported to the Senate by the Committee on Appropriations, would have funded the program at $106.6 million.

The Administration proposed funding MEP at $39.2 million in FY2005. H.R. 4754, as originally passed by the House, would have appropriated $106 million for this program. As reported by the Senate Committee on Appropriations, S. 2809 would have provided $112 million for MEP to "fully fund" existing centers and provide assistance to small and rural states. P.L. 108-447, supported manufacturing extension at $107.5 million (after several mandated rescissions included in the legislation).

For FY2006, the President's budget requested $46.8 million for the Manufacturing Extension Partnership, 56% below funding for the current fiscal year. H.R. 2862, as originally passed by both the House and the Senate, would have provided $106 million for the program. The final appropriation included in P.L. 109-108 was $104.6 million (after mandated rescissions, but not including a rescission from unobligated balances).

The Administration's FY2007 budget included $46.3 million for MEP. The FY2007 appropriations bill passed by the House, H.R. 5672, funded the program at $92 million. The version of H.R. 5672 reported from the Senate Committee on Appropriations provided $106 million for MEP. No final FY2007 appropriations legislation was enacted during the 109th Congress; however, the Partnership program was funded through February 15, 2007 by a series of continuing resolutions. Passed by the current Congress, P.L. 110-5 finances MEP at $104.6 million in FY2007.

The President's FY2008 budget proposal includes $46.3 million for manufacturing extension, a significant decrease from the current fiscal year. H.R. 3093, as passed by the House, would fund MEP at $108.8 million, while S. 1745, as reported would provide $110 million in FY2008.

In the current Congress, two bills passed by the House (H.R. 1868 and H.R. 2272) authorize a new program of partnerships between industry and other educational or research institutions to develop new manufacturing processes, techniques, or materials. In addition, a manufacturing fellowship program would be created with stipends available for post-doctoral work at NIST. These activities differ from the established MEP effort where no new manufacturing research is conducted as existing manufacturing technology is applied to the needs of small and medium-sized firms. (For additional information see CRS Report 97-104, *Manufacturing Extension Partnership Program: An Overview*, by Wendy Schacht.)

Different Approach?

As indicated above, the laws affecting the R&D environment have included both direct and indirect measures to facilitate technological innovation. In general, direct measures are those which involve budget outlays and the provision of services by government agencies. Indirect measures include financial incentives and legal changes (e.g., liability or regulatory reform; new antitrust arrangements). Supporters of indirect approaches argue that the market is superior to government in deciding which technologies are worthy of investment. Mechanisms that enhance the market's opportunities and abilities to make such choices are preferred. Advocates further state that dependency on agency discretion to assist one technology in preference to another will inevitably be subjected to political pressures from entrenched interests. Proponents of direct government assistance maintain, conversely, that indirect methods can be wasteful and ineffective and that they can compromise other goals of public policy in the hope of stimulating innovative performance. Advocates of direct approaches argue that it is important to put the country's scarce resources to work on those technologies that have the greatest promise as determined by industry and supported by its willingness to match federal funding.

In the past, while Republicans tended to prefer reliance on free market investment, competition, and indirect support by government, participants in the debates generally did not make definite (or exclusionary) choices between the two approaches, nor consistently favor one over the other. For example, some proponents of a stronger direct role for the government in innovation are also supporters of enhanced tax preferences for R&D spending, an indirect mechanism. Opponents of direct federal support for specific projects (e.g., SEMATECH, flat panel displays) may nevertheless back similar activities focused on more general areas such as manufacturing or information technology. However, beginning with the 104th Congress, legislators directed many of their efforts toward eliminating or curtailing some of the programs that previously had enjoyed bipartisan support. Initiatives to terminate the Advanced Technology Program, funding for flat panel displays, and agricultural extension reflected concern about the role of government in developing commercial technologies. The then Republican leadership stated that the government should directly support basic science while leaving technology development to the private sector. Instead of federal funding, changes to the tax laws, proponents argue, will provide the capital resources and incentives necessary for industry to further invest in R&D. Many of the same issues were considered in subsequent Congresses. While funding for several programs decreased, support for most on-going activities continued, some at increased levels. How the debate over federal funding evolves in the 110th Congress may serve to redefine thinking about the government's efforts in promoting technological advancement in the private sector.

Legislation in the 110th Congress

H.R. 85 (Biggert)

Energy Technology Transfer Act. Creates a program of grants to non-profit institutions, state and local governments, cooperative extension services, or universities to transfer energy efficient methods and technologies. Introduced January 4, 2007; referred to the House Committee on Science and Technology. Reported to the House on April 8, 2007 and passed the House, amended, on April 12, 2007. Received in the Senate April 13, 2007 and referred to the Senate Committee on Energy and Natural Resources. Hearings held on May 22, 2007.

H.R. 255 (Ehlers)

Manufacturing Technology Competitiveness Act of 2007. Creates an interagency committee to coordinate federal manufacturing R&D. Establishes and authorizes funding for a pilot collaborative manufacturing research grants program to promote the development of new manufacturing technologies through cooperative applied research among the private sector, academia, states, and other non-profit institutions. Mandates and authorizes financing for a manufacturing fellowship program. Creates and authorizes support for a manufacturing extension center competitive grants program to focus on new or emerging manufacturing technologies. Authorizes funding for the Manufacturing Extension Partnership, among other things. Introduced January 5, 2007; referred to the House Committee on Science and Technology.

H.R. 363 (Gordon)

Sowing the Seeds Through Science and Engineering Research Act. Authorizes a Presidential Innovation Award, among other things. Introduced January 10, 2007; referred to the House Committee on Science and Technology. Reported from the Committee, amended, on March 8, 2007. Passed the House on April 24, 2007. Received in the Senate and referred to the Senate Committee on Health, Education, Labor and Pensions on April 25, 2007.

H.R. 1712 (Johnson, E. B.)

The Research and Development Tax Credit Act of 2007. Makes the research tax credit permanent and allows for the issuance of tax exempt facility bonds for research park facilities used for research and experimentation, among other things. Introduced March 27, 2007; referred to the House Committee on Ways and Means.

H.R. 1868 (Wu)

Technology Innovation and Manufacturing Stimulation Act of 2007. Authorizes funding for the National Institute of Standards and Technology (NIST) through 2010 and creates several new manufacturing R&D programs in that organization. Funding for the Scientific and Technical Research and Services account within NIST is authorized at $471 million for FY2008, $498 million for FY2009, and $538 for FY2010. Authorizations for the Malcolm Baldrige National Quality Award Program would include $7.9 million in FY2008, $8.1 million in FY2009, and $8.3 million in FY2010. Support for construction and maintenance would be authorized at $94 million for FY2008, $86 million for FY2009, and $50 million for FY2010. Authorization of appropriations for Industrial Technology Services programs within NIST would include $223 million ($110 million for the Technology Innovation Program (TIP) and $113 million for MEP) for FY2008, $264 million ($142 million for TIP and $122 million for MEP) for FY2009, and $282 million ($150 million for TIP and $132 million for MEP) for FY2010. Among the new programs established within NIST would be a MEP Advisory Board, a Technology Innovation Program (to replace the Advanced Technology Program), collaborative manufacturing research pilot grants, a manufacturing fellowship program, and a manufacturing research database. Introduced April 17, 2007; referred to the House Committee on Science and Technology. Reported, amended, to the House on April 30, 2007. Passed by the House on May 3, 2007 and referred to the Senate Committee on Commerce, Science, and Transportation on May 7, 2007.

H.R. 2272 (Gordon)

21st Century Competitiveness Act of 2007. Title IV authorizes funding for the National Institute of Standards and Technology (NIST) through 2010 and creates several new manufacturing R&D programs in that organization. Funding for the Scientific and Technical Research and Services account within NIST is authorized at $471 million for FY2008, $498 million for FY2009, and $538 for FY2010. Authorizations for the Malcolm Baldrige National Quality Award Program would include $7.9 million in FY2008, $8.1 million in FY2009, and $8.3 million in FY2010. Support for construction and maintenance would be authorized at $94 million for FY2008, $86 million for FY2009, and $50 million for FY2010. Authorization of appropriations for Industrial Technology Services programs within NIST would include $223 million ($110 million for the Technology Innovation Program (TIP) and $113 million for MEP) for FY2008, $264 million ($142 million

for TIP and $122 million for MEP) for FY2009, and $282 million ($150 million for TIP and $132 million for MEP) for FY2010. Among the new programs established within NIST would be a MEP Advisory Board, a Technology Innovation Program (to replace the Advanced Technology Program), collaborative manufacturing research pilot grants, a manufacturing fellowship program, and a manufacturing research database. Introduced on May 10, 2007; referred to the House Committee on Science and Technology. Passed House on May 21, 2007 and received in the Senate on May 22, 2007. Placed on Senate Legislative Calendar under General Orders. Senate struck out all after the Enacting Clause and substituted the language of S. 761. Passed Senate, with the amendment, on July 19, 2007. Conference held on July 31, 2007. Conference report filed on August 1, 2007.

H.R. 3093 (Mollohan)

Makes appropriations for the Departments of Commerce and Justice, and science and related agencies for FY2008. Provides $108.8 million for the Manufacturing Extension Program and $93.1 million for the Advanced Technology Program, among other things. Introduced July 19, 2007; reported from the House Committee on Appropriations as an original measure. Passed House, amended, July 26, 2007.

S. 41 (Baucus)

Research Competitiveness Act of 2007. Amends the Internal Revenue Code to make the research and experimentation tax credit permanent. Among other things, this bill would allow the issuance of tax exempt facility bonds for research park facilities used for research and experimentation. Introduced January 4, 2007; referred to the Senate Committee on Finance.

S. 69 (Kohl)

Authorizes appropriations for the Manufacturing Extension Partnership through 2012, among other things. Introduced January 4, 2007; referred to the Senate Committee on the Judiciary. Discharged from the Senate Committee on the Judiciary by unanimous consent on January 22, 2007 and referred to the Senate Committee on Commerce, Science, and Transportation the same day.

S. 592 (Collins)

GoMe Act. Extends the research tax credit through 2012, among other things. Introduced February 14, 2007; referred to the Senate Committee on Finance.

S. 761 (Reid)

America Creating Opportunities to Meaningfully Promote Excellence in Technology, Education, and Science Act. Mandates a National Science and Technology Summit to access the state of U.S. science and technology. Requires a study on barriers to innovation and creates a National Innovation Medal and a President's Council on Innovation and Competitiveness. Authorizes appropriations for NIST through 2011 including $704 million for FY2008, $774 million for FY2009, $851 million for FY2010, and $937 million for FY2011. Requires that NIST establish an Innovation Acceleration Research Program to facilitate manufacturing innovation, among other things. Introduced March 5, 2007; placed on Senate Legislative Calendar under General Orders March 6, 2007. Passed Senate,

amended, on April 25, 2007. Received in the House on April 30, 2007. Senate incorporated this measure in H.R. 2272 as an amendment on July 19, 2007.

S. 833 (Coleman)

COMPETE Act of 2007. Makes the research and experimentation tax credit permanent, among other things. Introduced March 9, 2007; referred to the Senate Committee on Finance.

S. 1745 (Mikulski)

Departments of Commerce and Justice, Science, and Related Agencies Appropriations Act, 2008. Funds MEP at $110 million and ATP at $100 million (with a $10 million rescission from these two programs), among other things. Introduced June 29, 2007; reported from the Senate Committee on Appropriations as an original measure.